National Office for Identity Data
Ministry of the Interior and Kingdom Relations

State of the art Morph Detection

SOTAMD

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Outline

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- *Context*
- *Importance*
- *General objectives*
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- *Methodology*
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Overview of SOTAMD

- Qualified for an Action Grant of the European Commission
- Exp. February 2019 – February 2020
- Coordinator: National Office for Identity Data, NL
- Partners:
  - Bundeskriminalamt
  - University of Bologna
  - Hochschule Darmstadt
  - The University of Twente
  - Norwegian University of Science and Technology

Bundeskriminalamt

h_da
HOCHSCHULE DARMSTADT
UNIVERSITY OF APPLIED SCIENCES

UNIVERSITY OF TWENTE. NTNU

Importance

- The scale of the problem is potentially large
- Evaluate possible countermeasures for the vulnerability of current face recognition technology
- Numerous electronic passports potentially vulnerable

Context (1/2)

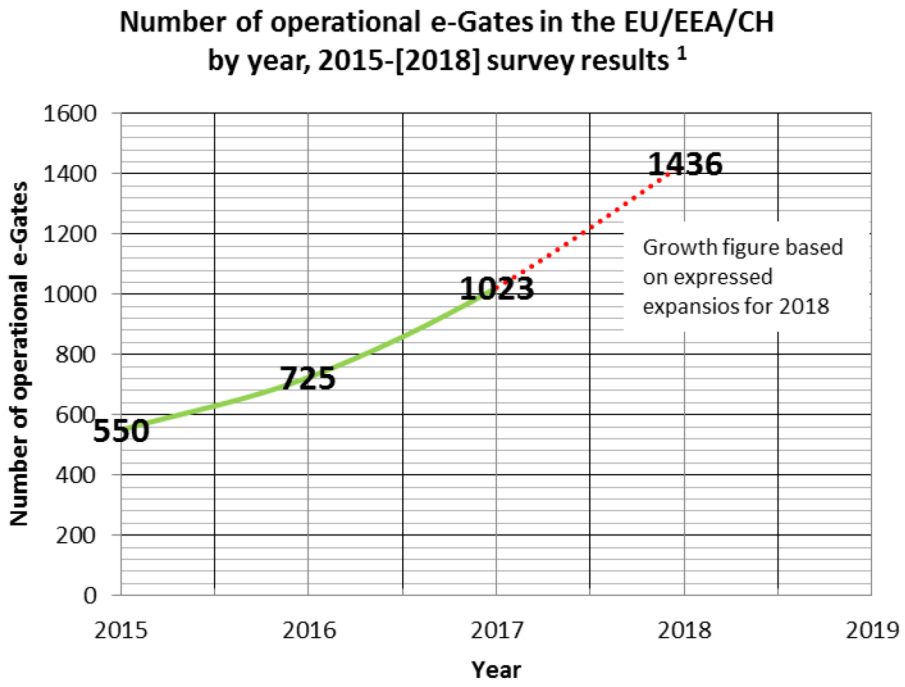
Research has shown that civil servants:

- are not aware of the possibility that photographs used for the application of identity documents may be morphed
- can easily be deceived by morphed passport photographs and
- would accept them as genuine passport photographs that satisfy the requirements for identity documents.

Also Look-a-like applications were accepted.

Context (2/2)

- Expected rise in passengers
- Deployment of biometric systems
- Vulnerability of biometric systems
- Morphed face image attacks

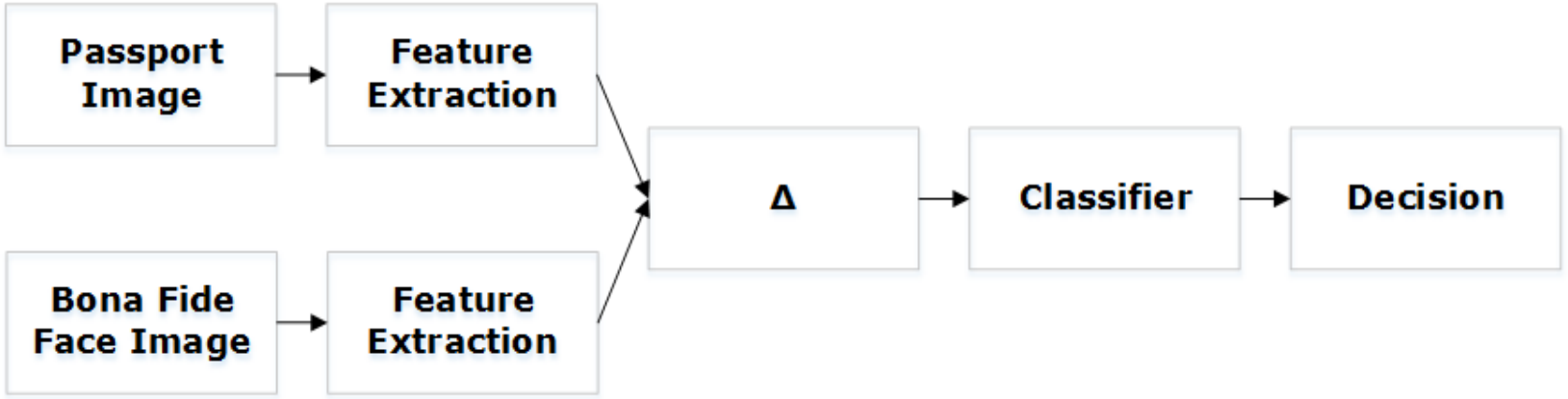


In morphed face image attacks, biometric samples of multiple subjects (i.e. natural persons) are merged in the signal or feature domain, in order to allow successful verification of all contributing subjects against morphed identity (i.e. the morphed face image).[2]

[1] Frontex - Role in EU border security research and activities in the area of biometrics 24-09-2018
[2] https://christoph-busch.de/files/Scherhag-Methodology-BIOSIG-2017.pdf

General objectives (1/2)

- Focus on automated border control gates, where the bona fide facial image is taken at the border gate. The scenario of differential morph detection, where the bona fide face image is compared, based on their information content, against the printed image in the passport application process.



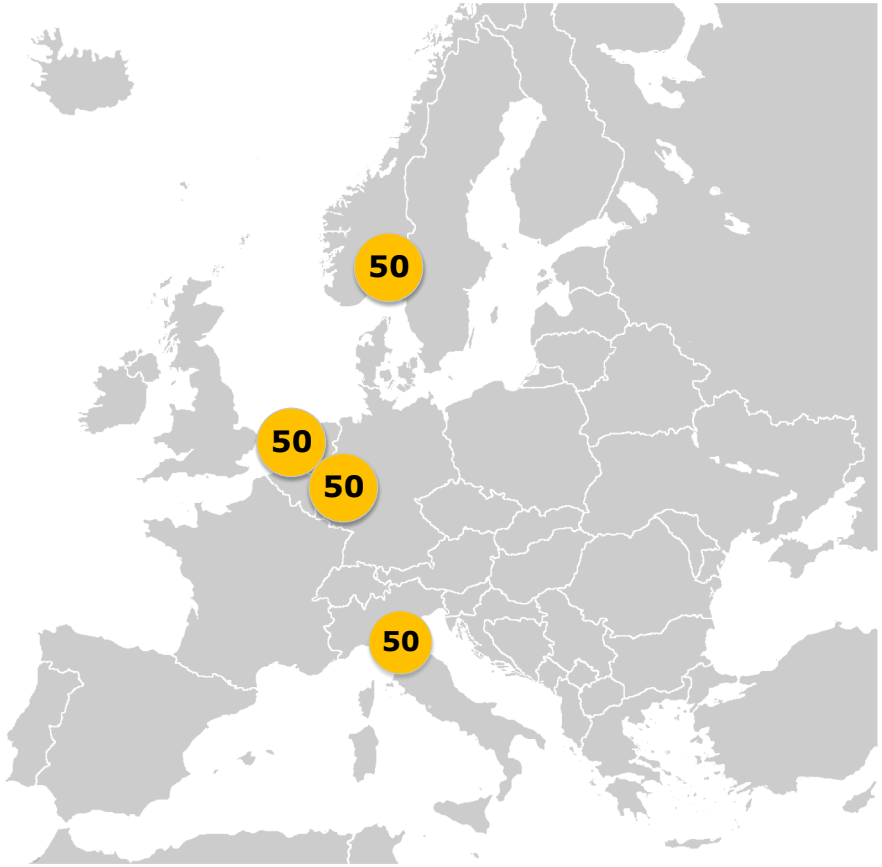
Differential morphing detection scheme

General objectives (2/2)

- **Select Morph Attack Detection mechanisms** designed for this specific operational modality and adapt and integrate these mechanisms in a **MAD evaluation platform.**

- **Identify** the state-of-the-art MAD mechanisms and **analyse their detection accuracy** on a sequestered dataset, collected by the participants.

Specific objectives



- At least **2** enrolment images and **2** probe images
- For each face image, **10** similar looking subjects will be selected
- At least **3** algorithms will generate morphed face images
- Automatically and manually **post-processed**
- All morphed face images printed and scanned
- At least 3 MAD mechanisms will be prepared
- The MAD mechanisms will be tested
- Accumulate and analyse findings

Methodology

- Independent data acquisition
- Evaluation protocol following ISO/IEC 30107-3
- Open access evaluation platform
  - Bologna benchmarking server
  - following NIST-FRVT-MORPH API
- Image processing pipeline
- Detection Error Trade-off curves (DET)

Work packages

- WP2 – Definition of database acquisition protocol and evaluation protocol
- WP3 – Database acquisition
- WP4 – Detection evaluation
- WP5 – Reporting and recommendations

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